

TD70-014

REV B

May 17, 2000

ORGANIZATIONAL ISSUANCE

TD70

Field Cleaning of
Components, Parts and
Installed Systems

Revision B

CHECK THE MASTER LIST-

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VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline	N/A	2/1/99	Initial Release
Revision	A	7/26/99	Changed URL location; Changed organizational code
Revision	B	5/17/2000	Updated applicable documents; Added HFE-7100 as an approved cleaning solvent

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1. PURPOSE

1.1 Scope. This procedure is applicable to MSFC in-house test operations and is restricted to use in situations where it is not feasible to clean elsewhere or where test operation and schedules would be unduly hampered if on-site field cleaning were not performed. This procedure shall not be used for mere convenience or for the routine cleaning of spare parts or facility buildup. This procedure does not apply to those facility items or systems cleaned under contract. This document supersedes EP91-9007.

1.2 Purpose. The purpose of this procedure is to provide instruction for field cleaning of test facility and test related hardware. This procedure establishes the cleaning methods, constraints, contamination control measures, and requirements for field cleaning of components, parts, and installed systems when it is deemed necessary to support test operations and schedules.

2. APPLICABILITY

This work instruction applies to the Technology Evaluation Department (TED) personnel and its contractors involved in any field cleaning operations in support of TED test operations.

3. APPLICABLE DOCUMENTS

MSFC-SPEC-164	Cleanliness of Components for use In Oxygen, Fuel, and Pneumatic Systems.
TD70-003	Test Preparation Sheet Implementation Instruction
TD70-013	Quality Record Retention Process
TD71-002	Contamination Prevention

4. DEFINITIONS

4.1 *Field Cleaning* - (also called handwipe or benchtop cleaning) the hand wiping, brushing and/or flushing of surfaces to remove visible contamination and/or suspected contamination

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from fuel, oxidizer, and pneumatic systems. Particulate and nonvolatile residue (NVR) analysis is not required for field cleaning. A visual inspection is required, except as otherwise noted in this document. In addition, for GOX and LOX systems and for pneumatic systems connecting to GOX or LOX systems, ultraviolet (black light) inspection for hydrocarbon contamination will be performed on metallic parts. The ultraviolet inspection shall be performed in a darkened area using a black light with a minimum radiation output of 1020 micro-watts as measured 15 inches from the bulb. No visible fluorescence will be allowed on surfaces which will be in contact with the medium.

4.2 AK-225 - ASAHIKLIN-225, AKA-225, HCFC-225; a hydrochlorofluorocarbon (HCFC) developed by Asahi Glass America, Inc. Research has shown AK-225 to be an effective replacement for Freon-113 in cleaning operations.

4.3 HFE-7100 - A hydroflouroether (HFE) developed by 3M which is also an effective cleaning solvent to replace Freon-113.

5. INSTRUCTIONS

5.1 Implementation

5.1.1 A condition of cleanliness equal to or superior to that of the original requirement for the system will be maintained when making repairs, reinstalling components, or when breaking into a MSFC fluid distribution system. After the completion of maintenance, repair or opening of an active fluid distribution system, the system will be evaluated and accepted for conformance.

5.1.2 Field cleaning will only be performed when: (a) Item is part of a fixed installation and cannot be physically moved to a remote and controlled cleaning operation; (b) Cleaned spare parts do not exist and cleaning at a remote and controlled cleaning operation would unduly hamper test operations; (c) Item has been removed from a previously cleaned system and reinstallation of the item is required to continue test operations.

5.1.3 Field cleaning will only be performed when defined and authorized by a Test Preparation Sheet (TPS) per TD70-003.

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5.1.4 The TPS will reference the applicable portions of this procedure or will outline steps to be followed.

5.2 Contamination Control

Refer to Document TD71-002.

5.3 Solvent Certification and Control

5.3.1 Cleaning solvents used for field cleaning shall be processed and controlled in accordance with requirements of MSFC-SPEC-164. Drums of solvent shall be identified and stamped by a unique Technology Evaluation Dept. serial number. Samples shall be furnished to Materials Processes & Manufacturing Dept. (MP&M) for analysis to MSFC-SPEC-164. Chemical Analyses Data Sheets issued from MP&M shall identify drums by serial number and be maintained on file by the Quality Records Custodian per TD70-013.

5.3.2 Acceptable drums of solvent shall be so stamped on the drum by a Safety Reliability & Quality Assurance Dept. representative prior to issuance for use. Once emptied, drums shall not be reused or refilled from other sources.

5.3.3 For active test operations, certified solvent drums may be issued and located at the test facility site to support on-going tests.

5.3.4 Certified solvent may be withdrawn from certified drums and placed in plastic or pressurized metallic aerosol containers for in-place cleaning depending on the solvent. The containers will be clearly identified as to the type of solvent and drum serial number. The containers shall be stored and controlled as to preclude contamination and unauthorized usage.

CAUTION: Plastic bottles shall not be used for storing AK-225; pressurized metallic containers must be used to reduce solvent evaporation.

5.3.5 All empty solvent containers shall be flushed with certified solvent prior to refilling.

5.4 Field Cleaning

5.4.1 The cleaning procedure shall remove all visible traces of oil, wax, gum, soils and particulate matter.

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5.4.2 Only certified solvent shall be used to perform the cleaning operations.

5.4.3 Small previously cleaned components such as seals, fittings and transducers, on which minor contamination is known or suspected, may be re-certified by handwiping with solvent-dampened lint-free wipes or flushing with clean solvent.

5.4.4 Accessible areas of large components, such as nozzles, inducers and pipe, which have been previously cleaned to an applicable specification, may be hand-wiped with solvent-dampened lint-free wipes or flushed with clean solvent when localized contamination is visible or suspected.

5.4.5 Tubing, pipe, and flex hoses with a nominal diameter of 2-inch or less which have been previously cleaned to an applicable specification or removed from an active system and subsequently contaminated to a minor extent (such as fingerprints or minute visible particles) may be re-certified by filling and dumping three times with clean solvent and drying with high flow certified gas. It is neither necessary nor feasible to perform ultraviolet (black light) or visual inspection for 2-inch or less tubing, piping, and flex hoses.

5.4.6 Components or parts which have internal surfaces which must be cleaned or which have significant contamination should be cleaned by flushing with a high flow of clean solvent and drying with high flow certified gas. It is neither necessary nor feasible to perform ultraviolet (black light) inspection of the internal surfaces.

5.4.7 Cleaning solvent shall be used only for one cleaning operation and then discarded or disposed of. Properly labeled solvent disposal containers (metal drums) shall be readily available. Used solvent rags may be thrown in regular trash containers.

5.4.8 Cleaning operations must be performed either outdoors or in a well ventilated area. Items cleaned shall be wrapped immediately, as appropriate, or shall be immediately installed in the system.

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5.4.9 Those components cleaned and inspected by the procedure outlined above are considered acceptable and will be so reflected on the TPS.

5.5 Quality Assurance will be notified by the performing organization prior to system repairs, modification or new installations so that proper cleanliness inspection coverage can be provided. QA will be responsible for reviewing and monitoring all activities concerning MSFC fluid systems and environmentally controlled areas. Quality monitoring will consist of reviewing specifications, work orders, Test Preparation Sheets (TPS), and will provide on-site inspection coverage for system repair, modification and installation; will request non-routine sampling and analyses when problems are encountered or when suspect conditions develop; and will provide specialized contamination control consultation services when requested.

5.6 The Materials Processes & Manufacturing Dept. will plan and implement the activities necessary to sample and analyze for the specified cleanliness levels for all MSFC operational systems. Analysis results will be provided by MP&M to the solvent using organizations (i.e. requester).

6. NOTES

Freon-113 and HFE-7100 is an acceptable solvent to use for cleaning per this procedure.

7. SAFETY PRECAUTIONS AND WARNING NOTES

7.1 Safety Precautions for AK-225 Solvent

7.1.1 AK-225 is more toxic than Freon and HFE-7100. AK-225 has an 8-hour exposure limit of 50 parts per million (ppm) compared to 1000 ppm for Freon. Personnel should use the solvent in a responsible, careful manner.

7.1.2 Inhalation is the major route of exposure. Breathing high concentrations of vapor may cause light-headedness, giddiness, shortness of breath, confusion, and may lead to narcosis, cardiac irregularities, or unconsciousness. Inhalation of high concentrations in a closely confined area may be fatal.

7.1.3 Liquid contact may irritate eyes.

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7.1.4 Repeated or prolonged exposure may irritate skin.

7.1.5 Consult the AK-225 Material Safety Data Sheet (MSDS) for additional information.

7.2 Warnings for Use of AK-225

7.2.1 Use only in well-ventilated area, preferably outdoors.

7.2.2 If used in an area where adequate ventilation is not available, personnel must wear a NIOSH approved negative pressure respirator with organic vapor cartridges.

7.2.3 Safety glasses must be worn when using AK-225. If splash is a potential, goggles should be used.

7.2.4 Viton, nitrile, polyvinyl alcohol, solvex, butyl, or neoprene gloves must be worn when using AK-225.

7.2.5 Do not use AK-225 near open flames or high heat. If AK-225 is exposed to flames or high heat situations, decomposition products in the form of hydrochloric and hydrofluoric acids may be generated.

7.3 Material Compatibility Limitations of AK-225

7.3.1 AK-225 is compatible with most metals. However, AK-225 is incompatible with alkaline earth metals, such as powdered Aluminum, Zinc, or Beryllium.

7.3.2 AK-225 is minimally compatible with the nonmetals Buna-N and Silicone. This means that these materials may exhibit a slight percentage change in volume, if cleaned with AK-225.

7.3.3 AK-225 is incompatible with the nonmetal Ethylene Propylene (EPDM). EPDM may exhibit a significant change in volume, if cleaned with AK-225.

8. APPENDICES, DATA, REPORTS, AND FORMS

N/A

9. RECORDS

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Chemical Analyses Data Sheets issued by MP&M Dept. shall be maintained as Quality Records in accordance TD70-013, QRR Process.

10. TOOLS, EQUIPMENT, AND MATERIALS

N/A

11. PERSONNEL TRAINING AND CERTIFICATION

All personnel working with or around the solvent AK-225 shall attend the AK-225 safety orientation meeting conducted by the Technology Evaluation Dept. safety personnel and be familiar with the hazards and appropriate use of AK-225.

12. FLOW DIAGRAM

N/A